

IN THE CLAIMS

1. (Cancelled)

2. (Currently Amended) ~~The method of manufacturing the electron beam device according to claim 1, characterized in that said electric field is 1 kV/mm or more in its electric field intensity~~ A method of manufacturing an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate; and
an electron emission portion forming process of forming the electron emission portions on the substrate,

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted using an electrode opposing a surface on the substrate on which the at least one wiring is formed, after the wiring forming step is completed and before said electron emission portion forming process is completed, and wherein the electric field is 1kV/mm or more in its electric field intensity.

3. (Currently Amended) [[The]] A method of manufacturing [[the]] an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate according to claim 1, the method comprising:

a wiring forming step of forming at least one wiring on the substrate;
and
an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed, and

characterized in that wherein said electric field applying [[step]] process comprises a step of discharging, by application of [[said]] the electric field, electricity from a portion of [[said]] the substrate from which electricity is liable to be discharged in various processes after said electric field applying process including said electron emission portion forming process, or when said electron beam device is used, to thereby change [[said]] the portion of the substrate into a shape which is difficult to discharge electricity.

4. (Currently Amended) The method of manufacturing the electron beam device according to claim 1, characterized in that 2, wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from [[said]] the wirings in correspondence with said respective ones of the electron emission portions, and said electric field applying [[step]] process is conducted before said electrode forming step is conducted.

5. (Currently Amended) The method of manufacturing the electron beam device according to claim 4, characterized in that said wherein the pair of electrodes comprise a pair of electrodes that constitute surface conduction type electron emission elements.

6. (Currently Amended) The method of manufacturing the electron beam device according to claim 5, characterized in that wherein said electrode forming step comprises a step which includes a thin film forming step of forming an electrically

conductive thin film on said the substrate, and produces a gap in said formed the electrically conductive thin film and constitutes [[said]] the pair of electrodes by [[said]] the electrically conductive thin [[films]] film which exists on both sides of [[said]] the gap.

7. (Currently Amended) [[The]] A method of manufacturing [[the]] an electron beam device according to claim 6, in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate;
and

an electron emission portion forming process of forming the electron emission portions on the substrate,

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise a pair of electrodes that constitute surface conduction type electron emission elements,

wherein said electrode forming step comprises a step which includes a thin film forming step of forming an electrically conductive thin film on the substrate, and produces a gap in the electrically conductive thin film and constitutes the pair of

electrodes by the electrically conductive thin film which exists on both sides of the gap,

and

characterized in that wherein said electric field applying [[step]] process is conducted before said thin film forming step is conducted.

8. (Currently Amended) A [[The]] method of manufacturing [[the]] an electron beam device according to claim 6; in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate;
and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise a pair of electrodes that constitute surface conduction type electron emission elements,

wherein said electrode forming step comprises a step which includes a thin film forming step of forming an electrically conductive thin film on the substrate, and

produces a gap in the electrically conductive thin film and constitutes the pair of electrodes by the electrically conductive thin film which exists on both sides of the gap, and

characterized in that wherein said electric field applying [[step]] process is conducted after said thin film forming step is completed and before the gap is produced in [[said]] the electrically conductive thin film.

9. (Currently Amended) The method of manufacturing the electron beam device according to claim 4, characterized in that said wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element.

10. (Canceled)

11. (Currently Amended) The method of manufacturing the electron beam device according to claim 9 or 10, characterized in that said electric field applying step is conducted before said emitter is formed: A method of manufacturing an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate; and
an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted using an electrode opposing a surface of the substrate on which the at least one wiring is formed after said wiring forming step is completed and before said electron emission portion forming process is completed, said electron emission portion forming step includes an electrode

forming step of forming a pair of electrodes to which different potentials are given from said wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted, and the pair of electrodes comprise an emitter and a gate of an electric field emission type electron emission element, said electric field applying process is conducted before the emitter is formed.

12. (Currently Amended) The method of manufacturing the electron beam device according to claim 11, characterized in that wherein said electric field applying [[step]] process is conducted before [[said]] the gate is formed.

13. (Currently Amended) The method of manufacturing the electron beam device according to claim 12, characterized in that said wherein the plurality of electron emission portions are connected onto one main surface of [[said]] the substrate in the form of a ladder or a matrix by [[said]] the wirings.

14. (Currently Amended) The method of manufacturing the electron beam device according to claim 13, characterized in that wherein, in said electric field applying [[step]] process, an electrode is disposed opposite to a surface of [[said]] the substrate on which [[said]] the wirings are disposed, and a voltage is applied between [[said]] the electrode and the wirings on [[said]] the substrate to apply [[said]] the electric field.

15. (Currently Amended) The method of manufacturing the electron beam device according to claim 13, characterized in that wherein a voltage given between [[said]] the electrode and [[said]] the wirings is changed during said electric field applying [[step]] process.

16. (Currently Amended) [[The]] A method of manufacturing [[the]] an electron beam device according to claim 13 in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate;
and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element,

wherein said electric field applying process is conducted before the emitter is formed,

wherein said electric field applying process is conducted before the gate is formed,

wherein the plurality of electron emission portions are connected onto one main surface of the substrate in the form of a ladder or a matrix by the wirings, and

characterized in that wherein a distance between [[said]] the electrode and [[said]] the wirings is changed during said electric field applying [[step]] process.

17. (Currently Amended) [[The]] A method of manufacturing [[the]] an electron beam device according to claim 13 in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate;
and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element,

wherein said electric field applying process is conducted before the emitter is formed,

wherein said electric field applying process is conducted before the gate is formed,

wherein plurality of electron emission portions are connected onto one main surface of the substrate in the form of a ladder or a matrix by the wirings, and

~~characterized in that wherein~~ a current limit resistor is connected between [[said]] ~~the~~ electrode and [[said]] ~~the~~ power supply that applies a voltage to [[said]] ~~the~~ electrode.

18. (Currently Amended) [[The]] A method of manufacturing [[the]] ~~an~~ electron beam device ~~according to claim 13 in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:~~

a wiring forming step of forming at least one wiring on the substrate;
and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed.

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element,

wherein said electric field applying process is conducted before the emitter is formed,

wherein said electric field applying process is conducted before the gate is formed,

wherein the plurality of electron emission portions are connected onto one main surface of the substrate in the form of a ladder or a matrix by the wirings
and

characterized in that wherein said electric field applying [[step]] process is conducted in a vacuum atmosphere.

19. - 101. (Cancelled)

102. (New) A method of manufacturing an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate;
and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element,

wherein the electric field emission type electron emission element comprises the emitter that emits electrons from an end portion and the gate that produces an electric field between the end portion and the gate,

wherein said electric field applying process is conducted before the emitter is formed,

wherein said electric field applying process is conducted before the gate is formed,

wherein the plurality of electron emission portions are connected onto one main surface of the substrate in the form of a ladder or a matrix by the wirings, and

wherein a distance between the electrode and the wirings is changed during said electric field applying process.

103. (New) The method of manufacturing an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect said electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate; and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission

portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element,

wherein said electric field emission type electron emission element comprises the emitter that emits electrons from an end portion and the gate that produces an electric field between the end portion and the gate,

wherein said electric field applying process is conducted before the emitter is formed,

wherein said electric field applying process is conducted before the gate is formed,

wherein the plurality of electron emission portions are connected onto one main surface of the substrate in the form of a ladder or a matrix by the wirings, and

wherein a current limit resistor is connected between the electrode and the power supply that applies a voltage to the electrode.

104. (New) A method of manufacturing an electron beam device in which electron emission portions that emit electrons and wirings that electrically connect the electron emission portions are disposed on a substrate, the method comprising:

a wiring forming step of forming at least one wiring on the substrate; and

an electron emission portion forming process of forming the electron emission portions on the substrate;

wherein an electric field applying process of applying a given electric field to the substrate on which the at least one wiring is formed is conducted after

said wiring forming step is completed and before said electron emission portion forming process is completed,

wherein said electron emission portion forming step includes an electrode forming step of forming a pair of electrodes to which different potentials are given from the wirings in correspondence with respective ones of the electron emission portions, and said electric field applying process is conducted before said electrode forming step is conducted,

wherein the pair of electrodes comprise an emitter and a gate of the electric field emission type electron emission element,

wherein the electric field emission type electron emission element comprises the emitter that emits electrons from an end portion and the gate that produces an electric field between the end portion and the gate,

wherein said electric field applying process is conducted before the emitter is formed,

wherein said electric field applying process is conducted before the gate is formed,

wherein the plurality of electron emission portions are connected onto one main surface of the substrate in the form of a ladder or a matrix by the wirings, and

wherein said electric field applying process is conducted in a vacuum atmosphere.

105. (New) The method of manufacturing the electron beam device according to claim 11, wherein the electric field emission type electron emission element comprises the emitter that emits electrons from an end portion and the gate that produces an electric field between the end portion and the gate.